

INSECTICIDAL/ACARICIDAL EFFICACY OF DIFFERENT FORMULATION OF PLANT OIL AGAINST COCONUT ERIOPHYID MITE, *ACERIA GUERRERONIS*

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ABSTRACT

Aceria guerreronis, the popularly known coconut mite has been established as a serious pest in the coconut (*Cocos nucifera*) growing countries of the world. It damage coconut, closer scrutiny of the infested nuts disclosed two courses of injurious manifestations involving crack development followed by nut fall and patch development leading to malformation of the nuts. There are so many traditional control methods to control the pest, but there functions either temporary or harmful or not effective. Our innovation to use biological pesticides like Karanja Oil (extracted from *Pongamia glabra*), Neem Oil (extracted from *Azadirachta indica*), Castor Oil (extracted from *Ricinus communis*) through root feeding. We treated these separately on the newly growing root of Coconut and get a significant result after 4 days treatment (90% mites are abolished for next 6 months). We gets best result when Karanja Oil, Neem Oil & Castor Oil are treated jointly in 1:1:1 ratio then other ratio for 4 days in 5-6 root in particular formulation.

KEYWORDS: *Aceria guerreronis*, Mite, *Cocos Nucifera*, Karanja Oil, Neem Oil, Castor Oil, Root Feeding

INTRODUCTION

We have a wrong concept about infection of coconut. We claim about the use of mobile phone, high tension electrical wires are caused for this damage. Present study proved that a mite, *Aceria guerreronis* are responsible for this economic damage. This mites feed epidermis & hypodermis of green coconut [10]. In Chemical control like DDT spray there are certain risk because a man must climbed on the tree for spraying, rain may wash out the chemical pesticide, and due to biomagnifications it may harm our body. Our previous 4 years repeated experiment through root feeding of biological pesticides [1, 2, 3, 4, 5, 6, 7] has no side effect and stay for longer time.

MATERIALS AND METHODS

These experiments were done at Naskarpur, Purba Medinipur, West Bengal. [GPS location: [DD (decimal degrees) Latitude-21.8187155; Longitude-87.61063460000003;] [DMS (degrees, minutes, seconds) Latitude: N21°49'7.376'' Longitude: E87°36'38.284'']]. We trial this experiment near about in this Geographical area from June to October season of 2011 to 2014. Coconut variety was var.; Titpur tal, crop variety are taken for this experiment, application method for the treatment of coconut tree was Root feeding, and the average age of the plants were 11-20 years.

To evaluate the bio efficacy of acaricides against eriophyid mite, a preliminary survey on the incidence and severity of this mite was conducted in and around Purba Medinipur.

Following treatment were followed to evaluate the efficacy of different plant oil specially Neem, Karanja and Castor through root treatment of coconut plant to check the attack of the eriophyid mite, *Aceria guerreronis*. Each treatment was replicated four times. The population of the mite were examined in an area of 12.56 mm² on 3-6 month old, infested nuts each tree a day prior to root application and subsequently .5, 1, 2, 3, 4 and 5 month of the application. The result also collected application of the oil extract at various time period i.e., 0, 1, 2, 3, 4 and 5 days application on 5 newly formed brick red coloured root. The applications were made in different formulation. In every cases with 50% water the oil were mixed thoroughly. Altogether 7 kinds of formulation were made. They are 1) Castor 2) Neem 3) Karanja 4) Karanja and Neem (1:1); 5) Neem: Castor (1:1) 6) Karanja: Neem (1:1) 7) Karanja: Neem: castor (1:1:1)

The experiment involved the replication of 4 times in a randomized Complete Block Design. A brick red root pencil thickness was selected and cut out obliquely was inserted in polythene cover containing chemical with equal quantity of water. The root feeding technique was only followed. The live mite were examined on 3-6 month old infested nuts in an area of 12.56mm² from each tree a day prior to root treatment and subsequently on 0, 5th, 10th 15th and 20th day as well as .5, 1, 2, 3, 4, and 5th month after treatment. The data were statistically analysed by following slandered method

RESULTS

Observations were taken after 0,1,2,3,4 and 5 days after treatment with 7 different formulation such as 1) Castor 2) Neem 3) Karanja 4) Karanja and Neem (1:1); 5) Neem: Castor (1:1) 6) Karanja: Neem (1:1) 7) Karanja: Neem: castor (1:1:1) though case may be in terms of percentage reduction of mite population. The result were presented in the table 1

Table 1: Mite Reduction (Percentage) in Coconut Plant after Use of Root Treatment in Different Days against Different Formulation of Biopesticide

	0 Day	1 Day	2 Day	3 Day	4 Day	5 Day
Castor oil(C)	0	12(.42)	22(.37)	31(.29)	43(.43)	42(.89)
Neem Oil (N)	0	19(.22)	32(.52)	46(.31)	55(.28)	52(.35)
Karanja Oil (K)	0	32(.73)	35(.29)	43(.52)	62(.39)	63(.87)
K+N	0	52(.52)	54(.71)	54(.33)	66(.74)	66(.57)
N+C	0	56(.31)	59(.35)	62(.78)	82(1.0)	84(.82)
K+C	0	71(.89)	73(.47)	68(.39)	89(1.1)	87(.68)
K+N+C	0	79(1.0)	82(.37)	96(.57)	96(.59)	96(.29)

We observed another set of experiment after treatment at 0.5, 1, 2, 3, 4 and 5 month & number present/sq cm with 7 different formulation such as 1) Castor 2) Neem 3) Karanja 4) Karanja and Neem (1:1); 5) Neem: Castor (1:1) 6) Karanja: Neem (1:1) 7) Karanja: Neem: castor (1:1:1) where we found duration power of repellent in Table 2

Table 2: Duration (Month) of Repellent Power (Number of Mite / Cm²) of Different Formulation of Different Bio-Pesticide to Control Mite

	0.5 Month	1 Month	2 Month	3 Month	4 Month	5 Month
Castor Oil(C)	3.9(.89)	12.9(.28)	93.2(.75)	113.2(.78)	123.2(1.2)	172.6(.48)
Neem Oil (N)	6.7(.78)	23.9(.56)	43.2(.35)	41.7(.75)	62.2(.98)	72.9(.56)
Karanja Oil (K)	3.9(.54)	34.3(.75)	53.7(.74)	51.4(.65)	53.6(.87)	93.9(.28)
K+N	2.1(.28)	23.9(.38)	33.9(.25)	35(.71)	29.8(.59)	42.2(.80)
N+C	1.7(.89)	9.3(.89)	3.6(.78)	17.2(.52)	19.9(.86)	23.9(.74)
K+C	0.9(.58)	6.6(.45)	2.2(.56)	5.5(.35)	6.7(.57)	9.6(.23)
K+N+C	0.3(.25)	2.1(.58)	1.3(.45)	1.1(.23)	3.2(.58)	2.9(.17)

Next, we treated the coconut tree through root feeding. At first select 5root/tree; treated during 4 days; counting area 12.56mm²; showing the data average(±SE). Table Showing 5, 10, 15, 20 Day After Treatment(DAT) with 7 different formulation such as 1) Castor 2) Neem 3) Karanja 4) Karanja and Neem (1:1); 5) Neem: Castor (1:1) 6) Karanja: Neem (1:1) 7) Karanja: Neem: castor (1:1:1) to find present percentage of mite count at different day after treatment in Table 3

Table3: Present Percentage of Mite Count at Different Day after Treatment

	Treatment	Dose(10ml)	Pre-Treatment Mite Control in 12.56mm ²	Percent Reduction in Mite Count			
				5 DAT	10 DAT	15 DAT	20 DAT
Castor(C)	Root	5root/tree	210.2	37(11)	19(3.6)	.15(.11)	.13(.11)
Neem Oil (N)	Root	5root/tree	214.2	14(3)	3.8(.21)	2.1(.12)	.19(.12)
Karanja Oil (K)	Root	5root/tree	198.3	19(5)	.19(.11)	.17(.12)	.15(.24)
K+N	Root	5root/tree	196.2	17(4.2)	.11(.34)	0.1(.02)	.9(.32)
N+C	Root	5root/tree	219.2	13(4.1)	.8(.52)	.7(.11)	.54(.42)
K+C	Root	5root/tree	198.3	12(2.1)	.45(.32)	.4(.12)	.38(.3)
K+N+C	Root	5root/tree	199.2	4(1.2)	.15(.2)	.13(.1)	.12(.11)

DISCUSSIONS

Karanja based products are found to be effective against insect pests of stored grains, field and plantation crops, and household commodities More than nineteen biologically active components have been identified from karanja plant. Oil, [1,2,11]organic leaf extract, methanolic and aqueous seed extract, of karanja have shown potential to act as oviposition deterrents, antifeedants, antibacterial, antifungal repellent and larvicidal against a wide range of insects. Karanja oil (*Pongamia glabra*) contains the non-glyceride toxins.¹

The bioefficacy of Karanja, and Neem oil against ticks were shown significant reduction in the ticks population. A tetranortriterpenoid Azadirachtin (C35H44O16) present in Neem oil is the most potent, natural insect feeding deterrent as well as insect growth regulator [1,2 3,4,5,9].

Tropical environment is suitable for Karanja, Castor and Neem tree. These oils are readily available in market at reasonable cost. Profitable oil isolation methods from well dried seeds include processes like cold dry pressing, steam distillation and solvent extraction technique. Formulation of crude vegetable oil is advantageous over the isolation and formulation of actives as it includes other potentially biotoxins present in seed and possesses excellent storage stability. Vegetable oils, like all other botanical resources, will considerably vary with respect to their bioactive content depending upon the variation in tropical conditions and efficiency of oil extraction technique. The agrochemical and medicinal importance of Karanja, Castor and Neem oil is proved by the series of above discussed work. [6, 7, 8]However, direct application of vegetable oil has drawback like high viscosity, less spreadability, cost of oil, probable overdose resulting into unconsumed residues in soil and aquatic system. This demands a suitable economically feasible formulation technique for their widespread agrochemical applications. [11]

From this experiment we observed that at the very beginning after application the result were not satisfactory. At 4th day after treatment we got best result. After 4th day of treatment no significant improvement were observed. After 4th day the reduction percentage of mite were 43,55,62,66,82,89 and 96 respectively against C, N, K, K+N(1:1), N+C(1:1), K+C(1:1) and K+N+C(1:1:1).

We used Castor oil, Neem Oil, Karanja Oil separately for mite control through the root treatment of Coconut tree. We found Mites were controlled for 1-2 months but after 2 months they came back and after 5 months they were growing as same as previously. After 2 months mites colony were 93.2(.75), 43.2(.35), 53.7(.74) present/sq cm area against Castor Oil, Neem Oil and Karanja Oil. But when we used K+N (1:1), N+C (1:1), K+C(1:1), K+N+C(1:1:1) got the significant result. After 2 months K+N, N+C, K+C, K+N+C are 33.9(.25), 3.6(.78), 2.2(.56), 1.3(.45) present/sq cm area respectively. After 5 months K+N, N+C, K+C, K+N+C are 42.2(.80), 23.9(.74), 9.6(.23), 2.9(.17) present/sq cm area respectively. So we find K+N+C(1:1:1) is the best combination for root feeding where after 5 months of treatment mite were 2.9(.17)/sq cm only.

CONCLUSIONS

To find Percent reduction in mite control after 5, 10, 15, 20 Day after Treatment (DAT) we set up another sets of experiment where we select 5 white root /tree and 10ml bio pesticide from 7 sets of combination and mite counting area were 12.56 mm². In pre-treatment mite counted in 12.56 mm² area and get Castor Oil (C), Neem Oil (N), Karanja Oil (K), K+N, N+C, K+C, K+N+C were respectively 210.2, 214.2, 198.3, 196.2, 219.2, 198.3, 199.2 and after 10 DAT they were respectively 19(3.6), 3.8(.21), 19(.11), 11(.34), 8(.52), 45(.32), 15(.2) which shows a significant reduction. After 20 DAT they were respectively 13(.11), 19(.12), 15(.24), 9(.32), 54(.42), 38(.3), 12(.11). So from this experiment we can conclude combination any of the combination of K+N/N+C/K+C/K+N+C is best for root treatment than separate use. But among them K+N+C is the best combination for root treatment of coconut tree to control the mite. This study also predicts that various ecological parameters, pedological factors, variety of the plant may affect the dose of the bio pesticide. It needs further investigation

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